CLAIMS

1. A method of bonding surfaces (1b, 2a) of two or more objects (1, 2) after the objects have been surface-treated, comprising:

surface-treating by controlling at least one (1b) of the bonding surfaces to be bonded together so as to have a predetermined roughness, and removing a bonding inhibitor substance (G) from the bonding surfaces and attaching a bonding enhancer substance on the bonding surfaces; and

bonding (S6) by bringing the bonding surfaces of the two or more objects into contact with each other and bonding them.

2. The bonding method according to claim 1, wherein the surface-treatment step includes an initial surface cleaning step (S1) of removing bonding inhibitor substances (G) that exist on the bonding surfaces (1b, 2a).

3. The bonding method according to claim 1, wherein each step is performed under the atmospheric pressure.

4. The bonding method according to claim 1, wherein, when the bonding surface has a surface roughness that is inappropriate for the materials to serve as a bonding surface, controlling of the surface roughness include a step of processing and controlling the bonding surfaces to have an appropriate surface roughness.

5. The bonding method according to claim 4, wherein the

surface roughness process/control step performs transferring an uneven surface profile to one bonding surface (1b) using a tool (3) formed with a profile having a predetermined roughness.

6. The bonding method according to claim 4, wherein the surface roughness process/control step is a method using atmospheric plasma.

7. The bonding method according to claim 4, wherein the surface roughness processing/control step is a blast treatment method wherein fine particles are blown.

8. The bonding method according to claim 1, wherein the surface-treatment step includes projecting energy particles or waves toward the bonding surfaces under the atmospheric pressure.

9. The bonding method according to claim 1, wherein the surface-treatment step is performed at the same time with the bonding step (S6).

10. The bonding method according to any one of claims 1, 8, and 9, wherein the surface-treatment step includes ultraviolet irradiation.

11. The bonding method according to any one of claims 1, 8, and 9, wherein the surface-treatment step includes irradiation of substances generated by atmospheric plasma.

12. The bonding method according to claim 1 or 9, wherein the bonding step (S6) is performed at room temperature.

13. An apparatus for bonding surfaces (1b, 2a) of two or more objects (1, 2) after the objects have been surface-treated, the apparatus comprising:

surface treatment means for removing a bonding inhibitor substance (G) from and attaching a bonding enhancer substance on at least one bonding surface that has been controlled to have a predetermined roughness; and

bonding means (6) for contacting the bonding surfaces of the two or more objects to bond them.

14. The bonding apparatus according to claim 13, wherein the surface treatment means is provided with initial surface cleaning means for removing bonding inhibitor substances (G) that exist on the bonding surfaces (1b, 2a).

15. The bonding apparatus according to claim 13, wherein the surface treatment means performs treatment under the atmospheric pressure.

16. The bonding apparatus according to claim 13, further comprising surface roughness processing/control means for processing the bonding surface (1b) to have a surface roughness appropriate for the material.

17. The bonding apparatus according to claim 16, wherein the surface roughness processing/control means transfers an uneven surface profile to one bonding surface (1b) using a tool (3) formed with a profile having a predetermined roughness.

18. The bonding apparatus according to claim 16, wherein the surface roughness processing/control means processes the bonding surface using atmospheric plasma to have a predetermined roughness.

19. The bonding apparatus according to claim 16, wherein the surface roughness processing/control means is a blast treatment device which blows fine particles to one bonding surface (1b) to have a predetermined roughness.

20. The bonding apparatus according to claim 13 or 16, wherein the surface treatment means is an ultraviolet irradiation device.

21. The bonding apparatus according to claim 13 or 16, wherein the surface treatment means is an atmospheric plasma treatment device which irradiates substances generated by atmospheric plasma.

22. A method of bonding surfaces (1b, 2a) of two or more objects (1, 2) after the objects have been surface-treated, comprising:

surface-treating by controlling at least one (1b) of the bonding surfaces to have a predetermined roughness, and modifying the bonding surfaces, on which no bonding inhibitor substances (G) exist or from which bonding inhibitor substances (G) have been removed, by letting bonding enhancer substances adhere under the existence of substances that adhere to the bonding surfaces in the atmosphere; and

bonding (S6) by contacting the modified bonding surfaces of the two or more objects and bonding them.